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How a 10-Kilowatt Threshold Shrank Germany's Rooftop Solar

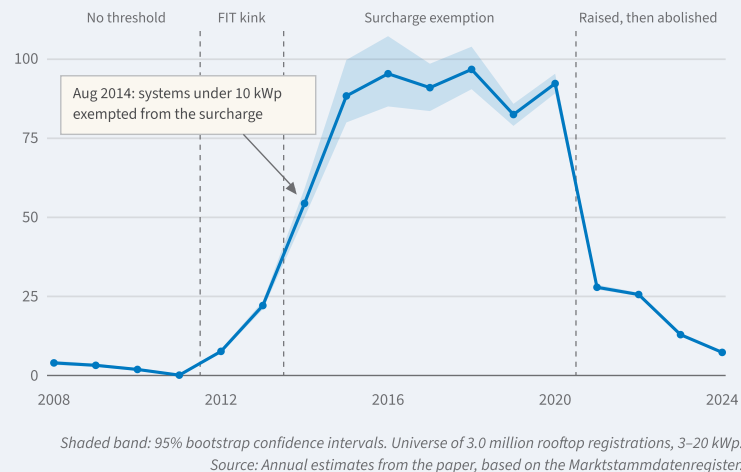
Climate policy is full of sharp eligibility thresholds drawn for administrative convenience. What happens when the money at stake at such a line dwarfs the cost of ducking under it? Germany found out. From August 2014, rooftop solar owners paid a surcharge on the electricity they consumed from their own panels; systems below 10 kilowatt-peak were exempt. The exemption was worth roughly 3,100 euros in present value — staying under the line meant forgoing a single 300-to-500-euro panel. In *Too Small by Design: How Threshold-Based Climate Policy Shrank the Panels It Subsidized* (APEP Working Paper 0727), the Autonomous Policy Evaluation Project traces what that cutoff did to the German rooftop market.

The paper draws on the Marktstammdatenregister, Germany's mandatory registry of energy installations — the universe of 3 million rooftop systems commissioned between 2008 and 2024. Because the same 10 kWp line was, in sequence, no threshold at all, a feed-in-tariff kink, a surcharge exemption, and finally raised and then abolished, the registry offers a four-regime natural experiment at a single cutoff.

The distortion was extreme. During the surcharge years, 61,979 systems were registered in the tenth-of-a-kilowatt bin just below the threshold, and 87 in the bin just above it. The bunching ratio — excess installations at the threshold relative to a smooth counterfactual — ranges from 52 to 98 across a pre-specified family of estimators, an order of magnitude beyond classic tax-notch settings.

Bunching of Rooftop Solar Systems at the 10-Kilowatt-Peak Threshold, 2008–2024

Bunching ratio: excess systems just below the threshold relative to a smooth counterfactual



During the surcharge years, 61,979 rooftop systems were registered just below the 10-kilowatt line, and 87 just above it.

The figure shows the policy switching the distortion on and off. Before any threshold existed, the bunching ratio hovered near 2. The 2012 feed-in-tariff kink raised it to 22. The 2014 surcharge exemption sent it to 86.5, peaking near 97. When the threshold moved to 30 kWp in 2021, the ratio collapsed to 27, then drifted toward 7 as the surcharge was abolished. Capacity levels with no policy meaning show nothing comparable once the technological clustering common to all years is netted out.

The mechanism is a single panel. Systems registered at 9.9 kWp cluster at 32 modules of 310 watts — 9,920 watts, as close to the line as a whole panel allows — while systems just above the threshold use smaller modules, and more of them. The result was a missing middle: the share of systems between 10 and 13 kWp collapsed from 18 percent before the policy to 2.3 per-

cent under it, then rebounded to 24.9 percent after abolition.

Summed over the surcharge years, the paper's distribution-based bounds put foregone capacity at 100–135 megawatts — roughly 100–135 gigawatt-hours of annual generation, enough to power 29,000–39,000 German households. The paper is explicit about what is and is not pinned down: the welfare numbers are bounds rather than point estimates, the exact bunching magnitude depends on estimator choices, and the role of professional installers in standardizing just-below systems is an interpretation rather than a demonstrated result.

The design lesson stands regardless: where technology is modular and the stakes at the line dwarf adjustment costs, a sharp threshold becomes a trap, shrinking the very systems the policy set out to subsidize — a warning for sharp cutoffs anywhere in technology-adoption policy.

This brief summarizes APEP Working Paper 0727 (v4). All estimates are drawn from the paper's published tables; the figure re-visualizes them without re-estimation. Full paper and code: github.com/SocialCatalystLab/ape-papers.

APEP working papers are AI-generated research and have not undergone human peer review; this paper has not yet been CRED-verified. APE Briefs are part of the Autonomous Policy Evaluation experiment in AI-generated research — not policy briefs for evidence-based policymaking.